DNA Damage and Repair Monitoring by Nanotechnology

Chiming Wei, MD, PhD
Johns Hopkins University School of Medicine

DNA damage and DNA repair are important pathophysiological processes of disease processing which include cardiac diseases, neurological diseases, liver diseases, kidney diseases and vascular diseases. DNA damage and DNA repair in mitochondria and nuclei remains controversial to date. Many DNA lesions, characteristic of DNA damage mediated by free radicals, were detected. Among the different oxidative-damage DNA products, 8-oxoG is one of the most stable and deleterious adduct. Both adenine and cytosine can be incorporated opposite to the 8-oxoG lesion to produce mismatched base pairs by polymerases during replication. If the 8-oxoG lesions in the DNA are not properly repaired, a high percentage of G/C to T/A transversions will occur through the 8-oxoG/A replication intermediate. Ta date, there is no clear regarding DNA damage products and DNA repair system in mitochondria and nuclei in many diseases and in different cells. Knowledge of protein interactions is crucial for understanding the pathways and networks operating within and between cells. The next generation of tools will need to enable both qualitative and quantitative studies on the precise protein interactions in situ.